Structures, Processes, and Responses of Plants

6-2 The student will demonstrate an understanding of structures, processes, and responses of plants that allow them to survive and reproduce. (Life Science)

6.2.4 Summarize the basic functions of the structures of a flowering plant for defense, survival, and reproduction.
Taxonomy level: 2.4-B Understand Conceptual Knowledge

Previous/Future knowledge: In 1st grade (1-2.4), students summarized the life cycle of plant, which included flowers and seeds. In 3rd grade (3-2.2), students explained how physical and behavioral adaptations (for example structures for defense) allowed organisms to survive.

It is essential for students to know that flowering plants have special structures that function for defense, survival, and reproduction.

Structures for Defense
Plants have structures for defense that protect them from threats and without these defenses the plant might die. Examples of natural defenses that plants have developed over time may be

- thorns that can defend the plant from being eaten by some animals
- fruits and leaves with poisons so that they are not eaten by animals
- the ability to close its leaves when touched (*thigmotropism*)

Structures for Survival
Plants have structures that allow them to survive in their habitats when the conditions are not suitable. Examples of parts of flowering plants that function for survival may be:

- Leaves function as the site of photosynthesis, respiration, and transpiration in plants.
- Stems support the plant and hold the leaves up to the light. Stems also function as food storage sites.
  - The *xylem* in the stems transports water from the roots to the leaves and other plant parts.
  - The *phloem* in the stems transport food made in the leaves to growing parts of the plant.
- Roots help anchor the plant in the ground.
  - They also absorb water and nutrients from the soil and store extra food for the plants.
  - The more surface area on the root that is available, the more water and nutrients it can absorb.
  - *Root hairs* help to increase this surface area.
- There are two types of roots: fibrous roots and taproots.
  - *Fibrous roots* consist of several main roots that branch off to form a mass of roots. Examples are grass, corn, and some trees.
  - *Taproots* consist of one large, main root with smaller roots branching off. Examples are carrots, dandelions, or cacti.
- Seeds have special structures that allow them to be dispersed by wind, water, or animals.
- The seeds coat helps protect the embryo from injury and also from drying out.

Structure for Reproduction
Parts of the flowering plant that function in reproduction include:
Flowers

- Flowers produce seeds.
- Many flowers contain both male and female parts needed to produce new flowers.
- Flower petals are often colorful or have a scent to attract insects and other animals.

Stamen
- The male part of a flower that has an *anther* on a stalk (*filament*).
- The anther produces the pollen that contains the sperm cells.

Pistil
- The female part of the flower that contains
  - The *ovary*, which contains the ovules where the egg cells are produced,
  - the *stigma,* which is the sticky top where pollen grains land, and
  - the *style,* which is a stalk down which the pollen tube grows after pollination has taken place

Seed
- The ovule that contains the fertilized egg (embryo) from which new plants are formed.
- A fruit that is formed from the ovary often protects them.

It is not essential for students to know the cell layers of leaf structures or other structures of roots or stems.

Assessment Guidelines:
The objective of this indicator is to *summarize* the basic functions of the structures of flowering plants; therefore, the primary focus of assessment should be to generalize points about the various structures needed for defense, survival, and reproduction. However, appropriate assessments should also require student to *identify* the parts of a flower used for reproduction; *identify* structures in plants used for defense, survival, or reproduction; *illustrate* a flower or plant structures using words, pictures, or diagrams; or *classify* a structure based on its function for defense, survival, or reproduction.